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Two new microfungi from Portugal: *Magnohelicospora iberica* gen. & sp. nov. and *Phaeodactylium stadleri* sp. nov.

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Abstract — Two new microfungi are described and illustrated from a forest in Portugal. *Magnohelicospora iberica* gen. & sp. nov. is distinguished by polyblastic, integrated, sympodial conidiogenous cells and solitary, doliiform or conical, multi-euseptate, brown conidia tightly coiled in three planes. *Phaeodactylium stadleri* sp. nov. is characterized by obovoid to clavate, 0- to 2-septate, coarsely verruculose, subhyaline to very pale brown conidia. A key to accepted *Phaeodactylium* species is provided.

Key words — *Ammophila arenaria,* anamorphic fungi, leaf litter, systematics

During the twenty-fifth mycological foray for study of the Iberian mycobiota held in the Minho and Braga provinces of Portugal, two undescribed anamorphic fungi were collected, one in a forest, the other near a beach. Individual samples of plant material were placed in paper and plastic bags, taken to the laboratory, and treated using the methods of Castañeda (2005). Mounts were prepared in polyvinyl alcohol-glycerol (8 g in 100 ml of water, plus 5 ml of glycerol) and measurements made at a magnification of ×1000. Photomicrographs were obtained with a Zeiss AXIO imager M1 microscope (Göttingen, Germany). The pure culture was obtained by transferring single conidia observed under a stereo-microscope on to oatmeal agar in Petri dishes, then incubated at 25°C

under near-UV, 12 h alternating cycles of light/dark. One new genus and two new species are described below.

Taxonomy

Magnohelicospora R.F. Castañeda, Hern.-Rest., Gené & Guarro, **anam. gen. nov.**

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Differs from *Helicoon* and *Inesiosporium* by differentiated conidiophores; from *Rogergoosiella* by sympodial proliferations of the conidiogenous cells; and from *Troposporium* and *Laocoon* by differentiated conidiophores, polyblastic conidiogenous cells and brown pigmented conidiophores and conidia.

Type species: *Magnohelicospora iberica* R.F. Castañeda et al.

Etymology: Latin , *magno-*, meaning great, Latin, *-helicospora*, referring to the helicospore, a coiled conidium that may turn in one or more complete rotations in two or three dimensions.

Anamorphic fungi. Colonies on the natural substratum effuse, hairy, brown to dark brown. Mycelium superficial and immersed. Conidiophores macronematous, mononematous, erect, smooth or verruculose, brown to dark brown. Conidiogenous cells polyblastic, integrated, sympodial, flattened, indeterminate. Conidial secession schizolytic. Conidia solitary, tightly coiled in three dimensions, doliiform to conical, multi-euseptate, acrogenous to acropleurogenous, brown to dark brown or olivaceous, smooth or verrucose. Teleomorph unknown.

Magnohelicospora iberica R.F. Castañeda, Hern.-Rest., Gené & Guarro, **anam. sp. nov.** Figs. 1, 2

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Differs from *Helicoon* spp., *Inesiosporium* spp., *Laocoon paradoxus Rogergoosiella roystoneicola,* and *Troposporium album* by its brown, differentiated conidiophores and sympodially proliferating conidiogenous cells.

Type: Portugal, Minho province, "Lagoas de Bertiandos", 41°46′N 8°38′W, C11/57, on rotten leaf of unidentified plant, 9 November 2011, R.F. Castañeda, M. Hernández-Restrepo, J. Gené & J. Mariné-Gené (**Holotype**, HAL 2447 F; **Isotype**, FMR 12184).

Etymology: Latin, *iberica*, in reference to the Iberian Peninsula.

Colonies on the natural substratum, effuse, hairy, hypophyllous, brown. Mycelium mostly immersed. Hyphae septate, branched, 2 µm diam., smooth, brown. Conidiophores macronematous, mononematous, erect, straight, simple, 3- to 5-septate, smooth, up to 150 µm tall, 5–8 µm wide at the base, brown below, pale brown towards the apex. Conidiogenous cells polyblastic, terminal, indeterminate, sympodially proliferating, 15–25 × 4–5 µm, integrated, pale brown. Conidial secession schizolytic. Conidia solitary, acrogenous or acropleurogenous, compactly circinate in three dimensions, doliiform to somewhat conical, with a truncate basal cell, 2–3 µm wide and

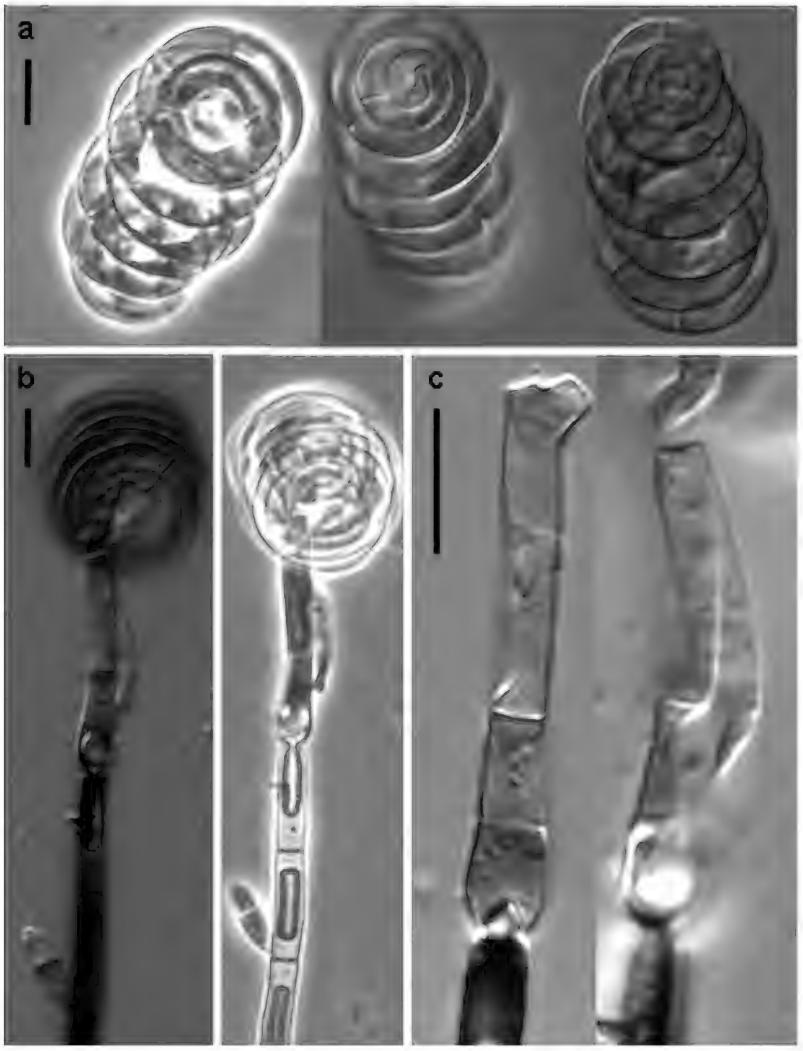

Fig. 1. *Magnohelicospora iberica* (ex holotype HAL 2447F)
a. Conidia. b. Conidiogenous cells and conidia. c. Conidiogenous cells. Scale bars = 10 µm.

rounded to obtuse apical cell, multiseptate, 35–50 × 23–30 µm, brown, smooth, dry, composed of filaments tightly coiled 7–9 times in 3-dimensions, brown or olivaceous-brown, euseptate, smooth, 4–5 µm wide. Teleomorph unknown.

Note: According to the key given by Kendrick in Seifert et al. (2011), the genera *Helicoon* Morgan, *Inesiosporium* R.F. Castañeda & W. Gams, *Rogergoosiella*

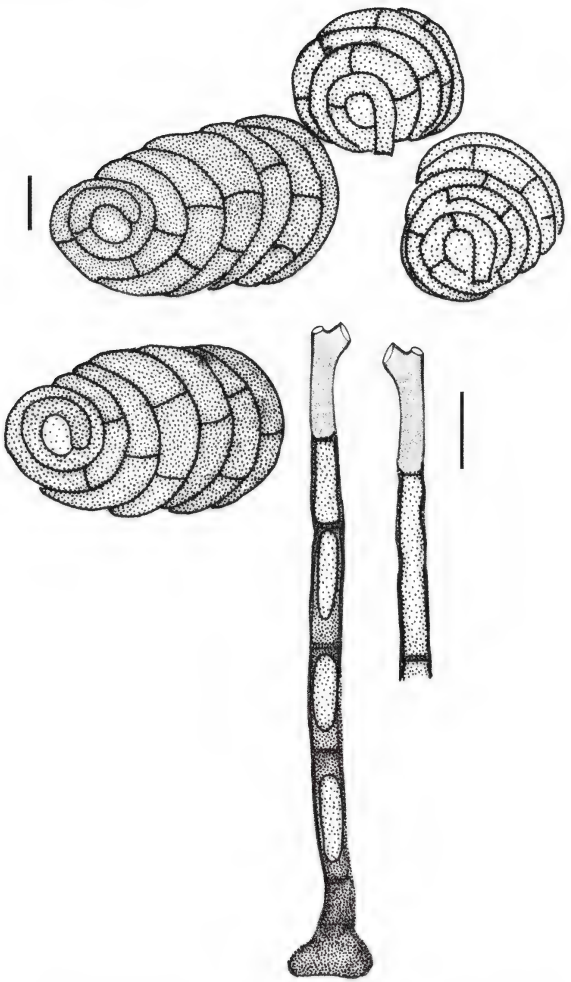

FIG. 2. *Magnohelicospora iberica* (ex holotype HAL 2447F).
Conidiophores, conidiogenous cells and conidia. Scale bars = 10 µm.

A. Hern. Gut. & J. Mena, and *Troposporium* Harkn. are superficially similar to *Magnohelicospora*. *Helicoon* does not have differentiated conidiophores, but the conidiogenous cells are polyblastic or monoblastic and denticulate, giving rise to euseptate, hyaline or dark pigmented conidia coiled in three planes (Zhao et al. 2007, Seifert et al. 2011). *Inesiosporium* has conidia strongly coiled in 3-dimensions and olivaceous to brown, but conidiophores are not differentiated and are mostly reduced to intercalary monoblastic conidiogenous cells each with a short subulate, lateral neck (Castañeda & Gams 1997, Zhao et al. 2007,

Seifert et al. 2011). *Rogergoosiella* is characterized by macronematous, simple or dichotomously branched dilute brown to hyaline conidiophores, with monoblastic, percurrently proliferating conidiogenous cells (Hernández-Gutiérrez & Mena 1996, Seifert et al. 2011). In *Troposporium* the conidiophores are undifferentiated, hyaline and bear monoblastic conidiogenous cells which produce hyaline, aseptate conidia coiled in 3-dimensions (Goos 1978, Seifert et al. 2011). The genus *Laocoon* J.C. David is also somewhat similar to *Magnohelicospora* but, *Laocoon* has conidia formed by filaments loosely coiled 1–5 times and the conidiogenous cells are polyblastic, each with a convex, cicatrized, melanized scar (David 1997), making them easy to differentiate from *Magnohelicospora*.

Phaeodactylium stadleri R.F. Castañeda, Hern.-Rest., Gené & Guarro, **anam. sp. nov.** FIGS 3–5

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Differs from *Phaeodactylium alpiniae* by its smaller, mostly 1-septate, obovoid, truncate, verruculose conidia.

TYPE: Portugal. Braga: "Playa de Ofir", Esposende, C11/66, on decaying stem of *Ammophila arenaria* (L.) Link (*Poaceae*), 10 November 2011, R.F. Castañeda, M. Hernández-Restrepo, J. Gené & J. Mariné-Gené (**Holotype**, HAL 2448 F; ex-holotype culture, IMI 501220, CBS 132715, FMR 12185).

ETYMOLOGY: Latin, *stadleri*, in honor of Dr Marc Stadler (Helmholtz-Center for infection Research, Germany) who has collaborated with us in the study of fungal diversity.

COLONIES on the natural substratum caespitose to pustule-like or pilose, gray. Mycelium superficial and immersed. Hyphae septate, branched, smooth, very pale brown to subhyaline, 1–3 µm diam. CONIDIOPHORES macronematous, congested fasciculate, tree-like, more or less dichotomously branched, with branches 120–150 µm long, erect, straight or flexuous, slightly geniculate to sinuate, multiseptate, very pale brown at the base, subhyaline towards the apex, up to 200–280 × 4–8 µm, smooth. CONIDIOGENOUS CELLS polyblastic, denticulate, intercalary and terminal, subhyaline or hyaline, 10–30 × 2–3 µm, discrete, slightly geniculate, branched, indeterminate, with numerous holoblastic sympodial proliferations. Conidial secession schizolytic. CONIDIA solitary, acropleurogenous, mostly obovoid, truncate and delicately cicatrized at the base, (0–)1(–2)-septate, strongly verruculose, 13–18 × 5–6 µm, very pale brown to subhyaline, dry. Teleomorph unknown.

Culture from the holotype: Colonies on oat meal agar, attaining 20–28 mm after two weeks at 25°C, white to gray. Reverse white. Mycelium immersed or aerial, arachnoid. Hyphae thin-walled, septate, hyaline, 1.5–2 µm diam. Sporulation obtained after 2 weeks, conidia similar to those observed in nature, 1–2-septate, verruculose, 14–23 × 4–6 µm, subhyaline. Cultures deposited: IMI 501220, CBS 132715, and FMR 12185.

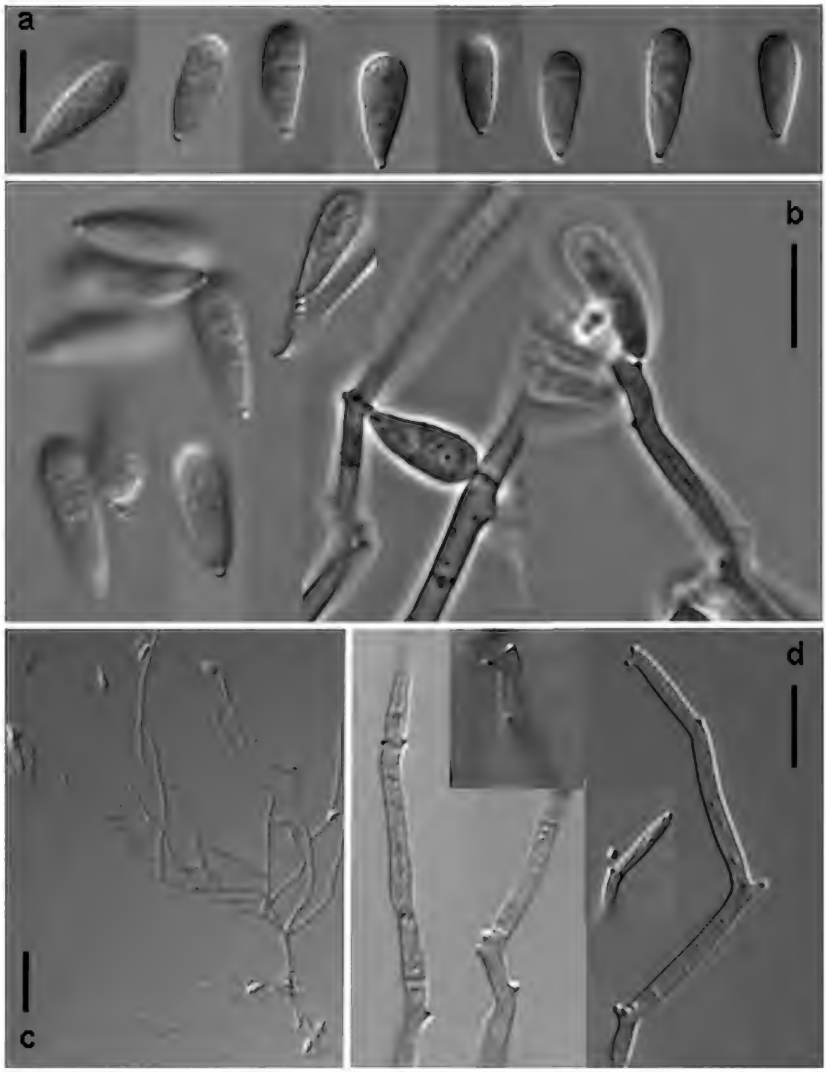

Fig. 3. *Phaeodactylium stadleri* (ex holotype HAL 2448F).
a. Conidia. b. Conidia and conidiogenous cells.
c. Conidiophore, conidiogenous cells and conidia. d. Conidiogenous cells.
Scale bars: a, b, d = 10 μm; c = 40 μm.

Note: The genus *Phaeodactylium* Agnihothr., as discussed by Castañeda et al. (2009), included three accepted species: *Phaeodactylium alpiniae* (Sawada) M.B. Ellis [= *P. venkatesanum* Agnihothr., the generic type], *P. biseptatum* R.F. Castañeda et al., and *P. curvularioides* Matsush. Another taxon *P. cephalotaxi*

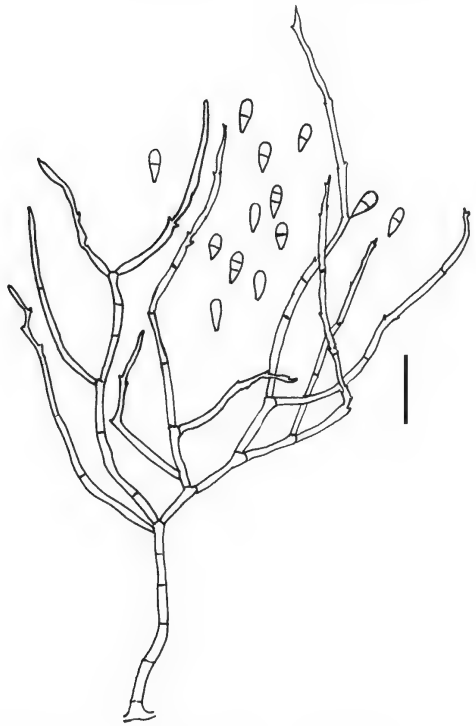

Fig. 4. *Phaeodactylium stadleri* (ex holotype HAL 2448F).
Conidiophores, conidiogenous cells and conidia. Scale bar = 40 µm.

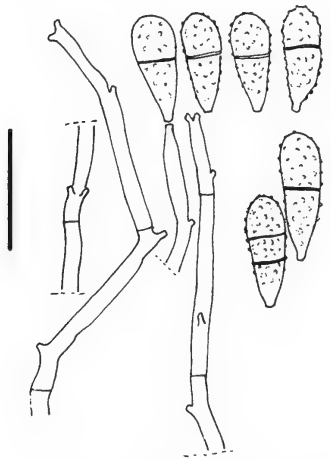

Fig. 5. *Phaeodactylium stadleri* (ex holotype HAL 2448F).
Conidiogenous cells and conidia. Scale bar = 10 µm.

Y.D. Zhang & X.G. Zhang has subsequently been added (Zhang et al. 2011). Only *P. alpiniae* is at all similar to *P. stadleri,* particularly in terms of the pigmentation of conidia, but *P. alpiniae* has conidia that are clavate, 16–25 × 6–9 µm, 3-septate and smooth, and the two taxa can be easily separated.

Key to accepted *Phaeodactylium* species

1 Conidia smooth-walled 2
Conidia closely verruculose, (0–)1–(–2)-septate, 13–18 × 5–6 µm, very pale brown to subhyaline ..... *P. stadleri*

2(1) Conidia 2-septate 3
Conidia 3-septate 4

3(2) Conidia clavate, fusiform or narrowly ellipsoid, but slightly ventricose at center, 10–14 × 2–3 µm, pale brown to subhyaline ..... *P. biseptatum*
Conidia narrowly ellipsoidal to clavate, pale brown to brown, 15–20.5 × 5–10 µm ..... *P. cephalotaxi*

4(2) Conidia ellipsoidal or clavate, tapered to the base, 16–25 × 6–9 µm, colorless or subhyaline, smooth ..... *P. alpiniae*
Conidia obovoid, 13–22 × 5–10 µm, with brown median cells and subhyaline ends, smooth ..... *P. curvularioides*

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